

What is claimed is:

1. A laser device for generating a laser pulse train formed of a sequence of laser pulses, comprising:

an output mirror;

5 a reflector mirror;

a gain medium disposed between said output mirror and reflector mirror for accumulating a laser gain;

a Q switch disposed between said output mirror and reflector mirror for turning on and off a laser oscillation by said output mirror, reflector mirror, and gain medium; and

10 a nonlinear optical crystal irradiated with a fundamental wave laser by the laser oscillation for generating a harmonic laser, wherein the laser oscillation is turned on by said Q switch during a first pause period before a generation of the laser pulse train, and the laser oscillation is turned off by said Q switch during a second pause period before a generation of the laser pulse.

2. The laser device of claim 1, wherein said nonlinear optical crystal is disposed between said output mirror and reflector mirror.

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3. The laser device of claim 1, further comprising a harmonic dispensing device disposed in an output path of the laser pulse.

4. The laser device of claim 3, wherein said harmonic dispensing device is an optical modulator.

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5. The laser device of claim 1, wherein said nonlinear optical

crystal is disposed at an opposite side of said reflector mirror about said output mirror.

6. The laser device of claim 1, wherein the second pause period
5 is substantially equal to a period of the laser pulse train extracted by a width of the laser pulse.

7. The laser device of claim 1, wherein the second pause period
10 is smaller than the period of the laser pulse train extracted by the width of the laser pulse.

8. The laser device of claim 7, wherein a power of the laser pulse is controlled by the second pause period.

9. The laser device of claim 1, further comprising a filter for
15 separating the harmonic laser generated by said nonlinear optical crystal and the fundamental wave laser.

10. A method of controlling a laser device having: an output
20 mirror; a reflector mirror; and a gain medium disposed between said output mirror and reflector mirror for accumulating laser gain, for generating a laser pulse train formed of a sequence of periodic laser pulses by a laser oscillation by said output mirror, reflector mirror and gain medium, said method comprising the steps of:

25 turning on the laser oscillation during a first pause period before a generation of the laser pulse train; and

turning off the laser oscillation during a second pause period

before a generation of the laser pulse.

11. The method of claim 10, further comprising the step of dispensing only the laser pulse.

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12. The method of claim 11, wherein said step of dispensing only the laser pulse comprises the sub step of dispensing only the laser pulse by an optical modulator.

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13. The method of claim 10, wherein the second pause period is substantially equal to a period of the laser pulse train extracted by a width of the laser pulse.

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14. The method of claim 10, wherein the second pause period is smaller than the period of the laser pulse train extracted by the width of the laser pulse.

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15. The method of claim 14, wherein a power of the laser pulse is controlled with the second pause period.

16. The method of claim 10, further comprising the step of generating harmonic laser from a fundamental wave laser by the laser oscillation.

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17. The method of claim 16, further comprising the step of separating the harmonic laser and the fundamental wave laser.

18. A laser processing machine for processing a work, having a laser device for generating a laser pulse train formed of a sequence of laser pulses, said laser device comprising:

an output mirror;

5 a reflector mirror;

a gain medium disposed between said output mirror and reflector mirror for accumulating a laser gain;

a Q switch disposed between said output mirror and reflector mirror for turning on and off the laser oscillation by said output mirror, reflector mirror and gain medium; and

10 a nonlinear optical crystal irradiated with a fundamental wave laser by the laser oscillation for generating a harmonic laser, wherein the laser oscillation is turned on by said Q switch during a first pause period before a generation of the laser pulse train, and the laser oscillation is turned off by said Q switch during a second pause period before a generation of the laser pulse.

19. The laser processing machine of claim 18, wherein said nonlinear optical crystal is disposed between said output mirror and reflector mirror.

20. The laser processing machine of claim 18, further comprising a harmonic dispensing device disposed in an output path of the laser pulse.

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21. The laser processing machine of claim 20, wherein said harmonic dispensing device is an optical modulator.

22. The laser processing machine of claim 18, wherein said nonlinear optical crystal is disposed at an opposite side of said reflector mirror about said output mirror.

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23. The laser processing machine of claim 18, wherein the second pause period is substantially equal to a period of the laser pulse train extracted by a width of the laser pulse.

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24. The laser processing machine of claim 18, wherein the second pause period is smaller than the period of the laser pulse train extracted by the width of the laser pulse.

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25. The laser processing machine of claim 24, wherein a power of the laser pulse is controlled with the second pause period.

26. The laser processing machine of claim 18, further comprising a filter for separating the harmonic laser generated by the nonlinear optical crystal and the fundamental wave laser.

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27. The laser processing machine of claim 18, wherein the work is a printed circuit board.

28. A method of processing a work using a laser processing machine including a laser device having: an output mirror; a reflector mirror; and a gain medium disposed between said output mirror and reflector mirror for accumulating a laser gain, for generating a laser pulse

train formed of a sequence of periodic laser pulses by a laser oscillation by said output mirror, reflector mirror and gain medium, said method comprising the steps of:

- turning on the laser oscillation during a first pause period before
5 a generation of the laser pulse train; and
turning off the laser oscillation during a second pause period
before a generation of the laser pulse.

29. The method of claim 28, further comprising the step of
10 dispensing only the laser pulse.

30. The method of claim 29, wherein said step of dispensing only
the laser pulse comprises the sub step of dispensing only the laser pulse by
an optical modulator.

31. The method of claim 28, wherein the second pause period is
substantially equal to a period of the laser pulse train extracted by a
width of the laser pulse.

32. The method of claim 28, wherein the second pause period is
smaller than the period of the laser pulse train extracted by the width of
the laser pulse.

33. The method of claim 32, wherein a power of the laser pulse
25 is controlled with the second pause period.

34. The method of claim 28, further comprising the step of

generating a harmonic laser from a fundamental wave laser by the laser oscillation.

35. The method of claim 34, further comprising the step of
5 separating the harmonic laser and the fundamental wave laser.

36. The method of claim 28, wherein the work is a printed circuit board.

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